Determination of Porosity Using a Water Pycnometer with Capacitive Level Detection

Vojko Matko*

University of Maribor, Faculty of Electrical Engineering and Computer Science, Smetanova 17, 2000 Maribor, Slovenia

(Received November 7, 2002; accepted November 4, 2003)

Key words: porosity, soils, capacitive-dependent crystal, direct digital method.

In response to a need for a more accurate porosity measuring method for small solid samples (approximately 1 g in mass), the porosity measurement sensor using the sensitive capacitive-dependent crystal was developed. This paper describes the new sensor. Presented are the probe sensitivity and frequency dependence on the volume. In addition, the new idea of excitation of the entire sensor with stochastic test signals is described, and the porosity measuring method is presented. This method includes the influence of test signals on the weighting function uncertainty. The experimental results of the porosity determination in volcanic rock samples are presented. The uncertainty of the porosity measurement is less than 0.1% in the temperature range 10–30°C.